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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/715,165

11/17/2003

Chan-Long Shieh

4161-A12

4115

27975

7590

01/10/2005

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EXAMINER

KANG, DONGHEE

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 01/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/715,165             | SHIEH ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Donghee Kang           | 2811                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 November 2004.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 7-9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/17/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) filed November 17, 2003.

### ***Election/Restrictions***

2. Applicant's election without traverse of Group I (Claims 1-10) in the reply filed on 11-03-04 is acknowledged.

### ***Claim Objections***

3. Claim 8 is objected to because of the following informalities: the drawing shows that a notch formed in the third mirror region but not in the first mirror region. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueki et al. (US 6,650,683) in view of Cox et al. (US 2003/0123514).

Re claims 1 & 3, Ueki et al. teach a vertical cavity surface emitting laser comprising (Fig.14):

A first mirror region (220) forming a first distributed Bragg reflector; a first cladding region (220) positioned on the first mirror region; an active region (230)

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positioned on the first cladding region; a second cladding region (240) positioned on the active region and including a high electrical resistance region (245) positioned to define a current path; a second mirror region (250) on the second cladding region; a current spreading region (260) positioned on the second mirror region; a first electrical contact (280) in electrical communication with the current spreading region and a second electrical contact (290) positioned to conduct electrical current in circuit with the first electrical contact through the current path; the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path; and a third mirror region (270) positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector. Ueki et al. do not explicitly teach the high electrical resistance region is formed by ion implanted method. However, it is conventional in the art and also Cox et al. teach the resistance region being usually formed either by implanting protons or by forming an oxide layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the resistance region using ion implanting method as taught by Cox in Ueki's device since the ion implantation is to be limited to only the designated areas of the substrate.

Re claim 2, Ueki et al. teach the first mirror region, the first cladding region, the active region, the second cladding region, the second mirror region, and the current spreading region include semiconductor layers.

Re claim 4, Ueki et al. teach the second mirror region includes from one to five pairs of alternate mirror layers of a first material with a first index of refraction and a second material with a second index of refraction.

Re claim 5, Ueki et al. teach the current spreading region includes at least one highly doped semiconductor layer.

Re claim 6, Ueki et al. teach the third mirror region includes a plurality of pairs of one of alternate semiconductor layers and alternate dielectric layers.

***Allowable Subject Matter***

6. Claim 10 is allowed.

Claims 7 & 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance and indicating an allowable subject matter.

Prior art of record fails to teach or suggest that a vertical cavity surface emitting laser includes an index guide formed in the current spreading region.

Prior art of record fails to teach or suggest that a vertical cavity surface emitting laser includes a tunneling junction.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

**Conclusion**

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Donghee Kang, Ph.D.  
Primary Examiner  
Art Unit 2811

dhk